

IN THE CLAIMS:

1. (Currently Amended) A method, in a data processing system, for detecting fraud, the method comprising:

receiving a set of historical data;

identifying a plurality of control points in the historical data, further comprising:

identifying a plurality of outliers in a distribution of the historical data; and

validating the plurality of outliers to distinguish between a first set of outliers and a second set of outliers, wherein the first set of outliers are classified as valid outliers and the second set of outliers are classified as invalid outliers, and wherein the first set of outliers are identified as the plurality of control points;

building at least one data model based on the plurality of control points, further comprising:

generating a fence that passes through the plurality of control points to define a boundary between data points, wherein data points within the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior;

receiving a set of updated data;

identifying one or more new control points based on the updated data, further comprising:

identifying an additional plurality of outliers in a distribution of the updated data;

and

validating the additional plurality of outliers to distinguish between a third set of outliers and a fourth set of outliers, wherein the third set of outliers are classified as valid outliers and the fourth set of outliers are classified as invalid outliers, and wherein the third set of outliers are identified as the one or more new control points;

adjusting the at least one data model to form an adjusted data model, within the at least one data model, based on the one or more new control points, wherein the at least one data model is refined for a plurality of iterations; and

verifying a transaction based on the adjusted data model.

2. (Original) The method of claim 1, wherein the historical data includes at least one of demographic data, psychographic data, transactional data, and environmental data.

3. (Currently Amended) The method of claim 1, wherein ~~identifying a plurality of control points includes:~~

~~identifying a~~ the plurality of outliers in ~~[[a]]~~ the distribution of the historical data are identified by analyzing the historical data using statistical modeling, outlier analysis, and data mining algorithms~~[[;]]~~

~~validating the plurality of outliers; and~~

~~categorizing the plurality of outliers as valid outliers or invalid outliers.~~

4-6. (Canceled)

7. (Original) The method of claim 1, wherein the updated data includes at least one of demographic data, psychographic data, transactional data, and environmental data.

8. (Currently Amended) The method of claim 1, wherein adjusting the at least one data model includes:

adding the one or more new control points to the at least one data model; and

generating ~~[[a]]~~ an adjusted fence that passes through the plurality of control points and the one or more new control points to define a boundary between data points, and wherein data points within the adjusted fence represent acceptable behavior and data points outside the adjusted fence represent ~~unacceptable~~ fraudulent behavior.

9. (Currently Amended) The method of claim 1, wherein adjusting the at least one data model includes:

changing one or more of the plurality of control points to the one or more new control points in the at least one data model; and

generating ~~[[a]]~~ an adjusted fence that passes through the plurality of control points to define a boundary between data points, and wherein data points within the adjusted fence represent acceptable behavior and data points outside the adjusted fence represent ~~unacceptable~~ fraudulent behavior.

10. (Previously Presented) The method of claim 1, further comprising:
determining whether the adjusted data model, within the at least one data model, reached a steady state;
converting the adjusted data model to a static model in response to a determination that the adjusted data model reached the steady state; and
refining the at least one data model for an iteration of the plurality of iterations in response to a determination that the adjusted data model has not reached the steady state.
11. (Previously Presented) The method of claim 10, wherein determining whether the adjusted data model reached a steady state includes:
determining a difference between the adjusted data model and a previous data model, within the at least one data model, to form a delta value; and
determining whether the delta value is less than a threshold.
12. (Original) The method of claim 11, wherein the threshold is two standard deviations from a mean within a normal distribution of the data.
13. (Currently Amended) A computer program product, in a computer readable medium, for detecting fraud, the computer program product comprising:
instructions for receiving a set of historical data;
instructions for identifying a plurality of control points in the historical data, further comprising:
instructions for identifying a plurality of outliers in a distribution of the historical data; and
instructions for validating the plurality of outliers to distinguish between a first set of outliers and a second set of outliers, wherein the first set of outliers are classified as valid outliers and the second set of outliers are classified as invalid outliers, and wherein the first set of outliers are identified as the plurality of control points;
instructions for building at least one data model based on the plurality of control points, further comprising:

instructions for generating a fence that passes through the plurality of control points to define a boundary between data points, wherein data points within the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior;

instructions for receiving a set of updated data;

instructions for identifying one or more new control points based on the updated data,
further comprising:

instructions for identifying an additional plurality of outliers in a distribution of the updated data; and

instructions for validating the additional plurality of outliers to distinguish between a third set of outliers and a fourth set of outliers, wherein the third set of outliers are classified as valid outliers and the fourth set of outliers are classified as invalid outliers, and wherein the third set of outliers are identified as the one or more new control points;

instructions for adjusting the at least one data model to form an adjusted data model, within the at least one data model, based on the one or more new control points, wherein the at least one data model is refined for a plurality of iterations; and

instructions for verifying a transaction based on the adjusted data model.

14. (Original) The computer program product of claim 13, wherein the historical data includes at least one of demographic data, psychographic data, transactional data, and environmental data.

15. (Currently Amended) The computer program product of claim 13, wherein ~~the instructions for identifying a plurality of control points include:~~

~~instructions for identifying a~~ the plurality of outliers in ~~[[a]]~~ the distribution of the historical data are identified by analyzing the historical data using statistical modeling, outlier analysis, and data mining algorithms~~[[;]]~~

~~instructions for validating the plurality of outliers; and~~

~~instructions for categorizing the plurality of outliers as valid outliers or invalid outliers.~~

16-18. (Canceled)

19. (Original) The computer program product of claim 13, wherein the updated data includes at least one of demographic data, psychographic data, transactional data, and environmental data.

20. (Currently Amended) The computer program product of claim 13, wherein the instructions for adjusting the at least one data model include:

instructions for adding the one or more new control points to the at least one data model;
and

instructions for generating ~~[[a]]~~ an adjusted fence that passes through the plurality of control points and the one or more new control points to define a boundary between data points, and wherein data points within the adjusted fence represent acceptable behavior and data points outside the adjusted fence represent ~~unacceptable~~ fraudulent behavior.

21. (Currently Amended) The computer program product of claim 13, wherein the instructions for adjusting the at least one data model include:

instructions for changing one or more of the plurality of control points to the one or more new control points in the at least one data model; and

instructions for generating ~~[[a]]~~ an adjusted fence that passes through the plurality of control points to define a boundary between data points, and wherein data points within the adjusted fence represent acceptable behavior and data points outside the adjusted fence represent ~~unacceptable~~ fraudulent behavior.

22. (Previously Presented) The computer program product of claim 13, further comprising:
instructions for determining whether the adjusted data model, within the at least one data model, reached a steady state;

instructions for converting the adjusted data model to a static model in response to a determination that the adjusted data model reached the steady state; and

instructions for refining the at least one data model for an iteration of the plurality of iterations in response to a determination that the adjusted data model has not reached the steady state.

23. (Previously Presented) The computer program product of claim 22, wherein the instructions for determining whether the adjusted data model reached a steady state include:
instructions for determining a difference between the adjusted data model and a previous data model, within the at least one data model, to form a delta value; and
instructions for determining whether the delta value is less than a threshold.
24. (Original) The computer program product of claim 23, wherein the threshold is two standard deviations from a mean within a normal distribution of the data.
25. (Currently Amended) An apparatus for detecting fraud, the apparatus comprising:
means for receiving a set of historical data;
means for identifying a plurality of control points in the historical data, further comprising:
means for identifying a plurality of outliers in a distribution of the historical data;
and
means for validating the plurality of outliers to distinguish between a first set of outliers and a second set of outliers, wherein the first set of outliers are classified as valid outliers and the second set of outliers are classified as invalid outliers, and wherein the first set of outliers are identified as the plurality of control points;
means for building at least one data model based on the plurality of control points, further comprising:
means for generating a fence that passes through the plurality of control points to define a boundary between data points, wherein data points within the fence represent acceptable behavior and data points outside the fence represent fraudulent behavior;
means for receiving a set of updated data;
means for identifying one or more new control points based on the updated data, further comprising:
means for identifying an additional plurality of outliers in a distribution of the updated data; and

means for validating the additional plurality of outliers to distinguish between a third set of outliers and a fourth set of outliers, wherein the third set of outliers are classified as valid outliers and the fourth set of outliers are classified as invalid outliers, and wherein the third set of outliers are identified as the one or more new control points;
means for adjusting the at least one data model to form an adjusted data model, within the at least one data model, based on the one or more new control points, wherein the at least one data model is refined for a plurality of iterations; and
means for verifying a transaction based on the adjusted data model.